ISAAC Conference, 23-27 April, 2007, Tbilisi, Georgia
Dedicated to the Centenary of I.Vekua

THE BOUNDARY VALUE PROBLEMS OF MAGNETOELASTICITY DYNAMICS FOR IDEAL ELECTROCONDUCTIVE ISOTROPIC CIRCLE

Toradze D.

Tbilisi State University
Tbilisi, Georgia

Let us consider the case, when strong, permanent magnetic $H° = (0, 0, H°)$ field acts perpendicular to given, elastic flatness of K^+ circle. In case of flat bulge equations, dynamics are of the following type:

$$\mu \Delta u + (\lambda + \mu + \alpha_0) \operatorname{grad} \operatorname{div} u - \rho \partial_t^2 u = 0, \qquad x \in K^+$$

$$h(x, t) = \operatorname{rot}[u \times H°], \qquad e(x, t) = -\mu_e [\partial_t u \times H°], \qquad j = \operatorname{rot} h,$$

where $\alpha_0 = \mu_e (H°)^2$, $u = (u_1, u_2, 0)$ _ is a vector of displacement, j _ is an electric current density; h and e _ are accordingly fields of magnetic and electric intensities. We will consider problems for these equations with following boundary conditions:

I: $u_n^+(z, t) = f(z, t)$, $[M u]_s^+ = F(z, t)$;
II: $u_s^+(z, t) = f(z, t)$, $[M u]_n^+ = F(z, t)$

where $f = (f_1, f_2, 0)$ and $F = (F_1, F_2, 0)$ are functions given at boundary (circumference) $M u = T(\partial_x, n) u + Q(h)$ _ is a vector magnetoelastic stresses, $Q(h) = ½ \mu_e [H° \times [h \times n]]$, _ is a vector of Maxwell's stresses, $n = (n_1, n_2, 0)$ _ is and exterior normal, $s = (-n_2, n_1, 0)$ is the tangent of circumference.

Using the Laplace transform, the formulated problems are reduced to auxiliary problems for pseudooscillation equations. We have general representations of the solutions of these equations by means of metaharmonious functions. Representations of meta-harmonious functions are used for the circle. Problems of pseudooscillations are solved approximately, deviations are estimated. Conditions providing the use of Laplace's inverted theorem are determined.